

REMARKS

Claim 36 has been further amended to correct spelling errors. Claims 36, 41-54, 58 and 62-67 are in the application for examination.

Applicants' claims set out processes for the selective hydrogenation of unsaturated hydrocarbons in a hydrocarbon-containing stream employing a catalyst composition having as essential components: palladium, silver, an alkali metal or an alkali metal-containing compound, a selectivity enhancer selected from the group consisting of lead, bismuth, thorium, gallium, tin, antimony, germanium, arsenic, cadmium, mercury, and combinations of two or more thereof, and an inorganic support selected from the group consisting of silica, alumina, spinel, and combinations of two or more thereof.

Objection has been made to claim 36 because of spelling errors. These errors have been corrected by the amendment of the claim set out above. In view of these corrections removal of the objection is respectfully requested.

Claims 36, 42, 43, 47, 49, 50, 51-53, 58, 62, 63, 65 and 66 have been rejected under 35 U.S.C. 103(a) as obvious over Sarrazin *et al.* (5,364,998) in view of Cosyns *et al.* (4,409,410) or Polanek *et al.* (5,227,553). These rejections of the claims are respectfully traversed.

Sarrazin *et al.* (5,364,998) is set out in the Office Action as disclosing a process for the hydrogenation of highly unsaturated hydrocarbons involving the use of a catalyst containing palladium, gallium, alkali metal and support.

Cosyns *et al.* (4,409,410) is set out as teaching that the presence of silver enhances the selectivity of palladium for diolefin (principally butadiene) hydrogenation.

Polanek *et al.* (5,227,553) is set out as teaching that cadmium, tin, lead, and silver are known as selectivity promoters for supported palladium catalysts. The disclosure states that this selectivity is for the conversion of butadienes to butenes.

In essence, the secondary disclosures are used in the rejections for the same purpose: to show that a palladium catalyst having an addition of silver is more selective in the hydrogenation of diolefins than a catalyst containing palladium without the silver. The combination of the

teachings of neither of the secondary disclosures with the primary disclosure take into consideration what effect the combination of all of the added components- silver, gallium, alkali metal and support- might have in combination on the palladium as a catalyst. As far as the art of record is concerned, the Applicants were the first to propose this total combination as a hydrogenation catalyst. Whereas in retrospect, having Applicants' invention before us, it might be said that it might be obvious to try the combination claimed by Applicants in view of the art applied, it cannot be said that the combination itself would be obvious. Applicants, therefore, respectfully request that the rejection of claims 36, 42, 43, 47, 49, 50, 51-53, 58, 62, 63, 65 and 66 under 35 U.S.C. 103(a) as obvious over Sarrazin *et al.* (5,364,998) in view of Cosyns *et al.* (4,409,410) or Polanek *et al.* (5,227,553) be removed.

Claims 36, 41-44, 49-53, 58, 62, 63 and 66 have been rejected under 35 U.S.C. 103(a) as unpatentable over Cheung *et al.* (5,475,173) in view of Polanek *et al.* (5,227,553). This rejection of the cited claims is respectfully traversed.

Cheung *et al.* (5,475,173) is set out in the Office Action as disclosing a process for the hydrogenation of unsaturated hydrocarbons (preferably 1,3-butadiene) involving the use of a catalyst containing palladium, silver, alkali metal and support.

Polanek *et al.* (5,227,553) is set out as teaching that cadmium, tin, lead, and silver are known as selectivity promoters for supported palladium catalysts. The disclosure states that this selectivity is for the conversion of butadienes to butenes.

Applicants find little difference in this rejection and the previous rejection of claims (which was removed) over this same Cheung disclosure in view of Lindlar *et al.* (3,715,404) in which Lindlar was cited for basically the same disclosure as Polanek. Applicants urge that Polanek does not disclose (A) what can be expected in the enhancement of catalytic activity of palladium by the addition of cadmium, tin or lead in selective hydrogenation processes also in the presence of silver and alkali metal or (B) what can be expected in the enhancing ability of silver and/or alkali metal when used with palladium if another material such as one or more of the metals of Polanek is added to the catalyst mix. Those skilled in the art know that the old saw, "obvious to try, is not obvious", applies. In the case of the number of multiple components set out in Applicants' claims, it is doubtful that the combination of the teachings of this art would even make the addition of the

metals of Polenak "obvious to try". Applicants, therefore, respectfully request the removal of the rejection of claims 36, 41-44, 49-53, 58, 62, 63 and 66 under 35 U.S.C. 103(a) as unpatentable over Cheung *et al.* (5,475,173) in view of Polanek *et al.* (5,227,553) be removed.

Claims 36, 41, 43-46, 49-53, 58, 62-64 and 66 have been rejected under 35 U.S.C. 103(a) as unpatentable over Cheung *et al.* (5,475,274) in view of Lindlar *et al.* (3,715,404). This rejection of the cited claims is respectfully traversed.

Cheung *et al.* (5,475,274) is set out in the Office Action as disclosing a process for the hydrogenation of unsaturated hydrocarbons (preferably 1,3-butadiene) involving the use of a catalyst containing palladium, silver, alkali metal fluoride and support.

Lindlar *et al.* (3,715,404) is set out as teaching that lead, bismuth, cadmium, tin, thorium and/or mercury are known as selectivity promoters for supported palladium catalysts.

Applicants find little difference in this rejection and the previous rejection of claims (which was removed) over the Cheung *et al.* (5,475,173) disclosure in view of Lindlar *et al.* (3,715,404) in which Cheung (5,475,173) was cited for basically the same disclosure as Cheung (5,583,274). Applicants urge that Lindlar does not disclose (A) what can be expected in the enhancement of catalytic activity of palladium by the addition of cadmium, tin or lead in selective hydrogenation processes also in the presence of silver and alkali metal or (B) what can be expected in the enhancing ability of silver and/or alkali metal when used with palladium if another material such as one or more of the metals of Lindlar is added to the catalyst mix. Those skilled in the art know that the old saw, "obvious to try, is not obvious", applies. In the case of the number of multiple components set out in Applicants' claims, it is doubtful that the combination of the teachings of this art would even make the addition of the metals of Lindlar "obvious to try". Applicants, therefore, respectfully request the removal of the rejection of claims 36, 41-44, 49-53, 58, 62, 63 and 66 under 35 U.S.C. 103(a) as unpatentable over 36, 41, 43-46, 49-53, 58, 62-64 and 66 have been rejected under 35 U.S.C. 103(a) as unpatentable over Cheung *et al.* (5,475,274) in view of Lindlar *et al.* (3,715,404) be removed.

Claims 54 and 67 have been rejected under 35 U.S.C. 103(a) as unpatentable over Cheung *et al.* (5,475,173) in view of Polanek *et al.* (5,227,553) as applied to claims 36, 41-44, 49-53, 58, 62, 63 and 66 above in view of Collins (4,126,645). These rejections are respectfully traversed.

Applicants have pointed out above that claims of this application should not be rejected under 35 U.S.C. 103(a) over the combination of the disclosures of Cheung *et al.* 5,475,173 in view of Polanek *et al.* (5,227,553). The Collins (4,126,645) disclosure adds nothing to supplement the basic deficiency of the combination of the disclosures of Cheung *et al.* 5,475,173 in view of Polanek *et al.* (5,227,553) as set out above. In fact, the Collins disclosure simply adds another disclosure that it is known that palladium can be deposited near the surface of a skin on an alumina support without regard to what the presence of other added materials might contribute or detract from the overall performance of a catalyst. Applicants, therefore, respectfully request the removal of the rejection of claims 54 and 67 under 35 U.S.C. 103(a) as being unpatentable over Cheung *et al.* 5,475,173 in view of Polanek *et al.* (5,227,553) as applied to claims 36, 41-44, 49-53, 58, 62 and 66 above in view of Collins (4,126,645) be removed.

Claim 48 has been rejected under 35 U.S.C. 103(a) as unpatentable over Cheung *et al.* (5,475,173) in view of Polanek *et al.* (5,227,553) as applied to claims 36, 41-44, 49-53, 58, 62 and 66 above in view of Sarrazin *et al.* (5,364,998). This rejection is respectfully traversed.

The statement of this rejection (since it attributes nothing to the Polanek disclosure) seems to substitute the gallium of the Sarrazin disclosure for the cadmium, tin and lead of the Polanek disclosure, thereby disclosing a catalyst containing palladium, silver, alkali metal and support (Cheung) and gallium (Sarrazin). The combination of the disclosures of Cheung ('173) and Sarrazin is subject to the same discussion as set out above for Cheung ('173) and Polanek. Applicants urge that Sarrazin does not disclose (A) what can be expected in the enhancement of catalytic activity of palladium by the addition of cadmium, tin or lead in selective hydrogenation processes also in the presence of silver and alkali metal or (B) what can be expected in the enhancing ability of silver and/or alkali metal when used with palladium if another material such as one or more of the metals of Sarrazin is added to the catalyst mix. Those skilled in the art know that the old saw, "obvious to try, is not obvious", applies. In the case of the number of multiple components set out in Applicants' claims, it is doubtful that the combination of the teachings of this art would even make the addition of the metal of Sarrazin "obvious to try". Applicants, therefore, respectfully request the removal of the rejection of claim 48 under 35 U.S.C. 103(a) as unpatentable over Cheung *et al.* (5,475,173) in view of Polanek *et al.*

(5,227,553) as applied to claims 36, 41-44, 49-53, 58, 62 and 66 above in view of Sarrazin *et al.* (5,364,998) be removed.

Applicants respectfully request that any action on the double patenting rejection over co-pending application 09/459,846 in view of Lindlar *et al.* (3,715,404) be held in abeyance until patentable subject matter is found among the claims of this application.

In view of the amendments and remarks above it is respectfully requested that the rejection of claims be reconsidered and all the claims, as amended, be found allowable.

Respectfully submitted,  
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### Appendix

Claim 36. (Thrice Amended) A process comprising contacting [cocntacting] a fluid with a catalyst composition wherein said fluid comprises highly unsaturated [unsaaturated] hydrocarbon; said composition consists essentially of (1) palladium, (2) silver, (3) an alkali metal or an alkali metal-containing compound, (4) a selectivity enhancer selected from the group consisting of lead, bismuth, thorium, gallium, tin, antimony, germanium, arsenic, cadmium, mercury, and combinations of two or more thereof, and (5) an inorganic support selected from the group consisting of silica, alumina, spinel, and combinations of two or more thereof, and said palladium, selectivity enhancer, and alkali metal or alkali metal-containing compound are each present in a sufficient amount to effect a selective hydrogenation of said highly unsaturated hydrocarbon.